



distal hereditary motor neuropathy, type II

Distal hereditary motor neuropathy, type II is a progressive disorder that affects nerve cells in the spinal cord. It results in muscle weakness and affects movement, primarily in the legs.

Onset of distal hereditary motor neuropathy, type II ranges from the teenage years through mid-adulthood. The initial symptoms of the disorder are cramps or weakness in the muscles of the big toe and later, the entire foot. Over a period of approximately 5 to 10 years, affected individuals experience a gradual loss of muscle tissue (atrophy) in the lower legs. They begin to have trouble walking and running, and eventually may have complete paralysis of the lower legs. The thigh muscles may also be affected, although generally this occurs later and is less severe.

Some individuals with distal hereditary motor neuropathy, type II have weakening of the muscles in the hands and forearms. This weakening is less pronounced than in the lower limbs and does not usually result in paralysis.

Frequency

The prevalence of distal hereditary motor neuropathy, type II is unknown. At least 25 affected families have been identified worldwide.

Genetic Changes

Mutations in the *HSPB1* and *HSPB8* genes cause distal hereditary motor neuropathy, type II. These genes provide instructions for making proteins called heat shock protein beta-1 and heat shock protein beta-8. Heat shock proteins help protect cells under adverse conditions such as infection, inflammation, exposure to toxins, elevated temperature, injury, and disease. They block signals that lead to programmed cell death. In addition, they appear to be involved in activities such as cell movement (motility), stabilizing the cell's structural framework (the cytoskeleton), folding and stabilizing newly produced proteins, and repairing damaged proteins. Heat shock proteins also appear to play a role in the tensing of muscle fibers (muscle contraction).

Heat shock protein beta-1 and heat shock protein beta-8 are found in cells throughout the body and are abundant in nerve cells. In nerve cells, heat shock protein beta-1 helps to organize a network of molecular threads called neurofilaments that maintain the diameter of specialized extensions called axons. Maintaining proper axon diameter is essential for the efficient transmission of nerve impulses. The function of heat shock protein beta-8 is not well understood, but studies have shown that it interacts with heat shock protein beta-1.

The *HSPB1* and *HSPB8* gene mutations that cause distal hereditary motor neuropathy, type II change single protein building blocks (amino acids) in the protein sequence. If either protein is altered, they may be more likely to cluster together and form clumps (aggregates). Aggregates of heat shock proteins may block the transport of substances that are essential for the proper function of nerve axons. The disruption of other cell functions in which these proteins are involved may also contribute to the signs and symptoms of distal hereditary motor neuropathy, type II.

Inheritance Pattern

This condition is inherited in an autosomal dominant pattern, which means one copy of the altered gene in each cell is sufficient to cause the disorder.

Other Names for This Condition

- distal hereditary motor neuronopathy, type II

Diagnosis & Management

Genetic Testing

- Genetic Testing Registry: Distal hereditary motor neuronopathy type 2A
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C1834692/>
- Genetic Testing Registry: Distal hereditary motor neuronopathy type 2B
<https://www.ncbi.nlm.nih.gov/gtr/conditions/C2608087/>

Other Diagnosis and Management Resources

- MedlinePlus Encyclopedia: Weakness
<https://medlineplus.gov/ency/article/003174.htm>

General Information from MedlinePlus

- Diagnostic Tests
<https://medlineplus.gov/diagnostictests.html>
- Drug Therapy
<https://medlineplus.gov/drugtherapy.html>
- Genetic Counseling
<https://medlineplus.gov/geneticcounseling.html>
- Palliative Care
<https://medlineplus.gov/palliativecare.html>
- Surgery and Rehabilitation
<https://medlineplus.gov/surgeryandrehabilitation.html>

Additional Information & Resources

MedlinePlus

- Encyclopedia: Weakness
<https://medlineplus.gov/ency/article/003174.htm>
- Health Topic: Neuromuscular Disorders
<https://medlineplus.gov/neuromusculardisorders.html>

Additional NIH Resources

- National Institute of Neurological Disorders and Stroke: Hereditary Neuropathies
<https://www.ninds.nih.gov/Disorders/All-Disorders/Hereditary-Neuropathies-Information-Page>

Educational Resources

- MalaCards: distal hereditary motor neuropathy, type ii
http://www.malacards.org/card/distal_hereditary_motor_neuropathy_type_ii
- Orphanet: Distal hereditary motor neuropathy type 2
http://www.orpha.net/consor/cgi-bin/OC_Exp.php?Lng=EN&Expert=139525

Patient Support and Advocacy Resources

- Hereditary Neuropathy Foundation
<http://www.hnf-cure.org/>

ClinicalTrials.gov

- ClinicalTrials.gov
<https://clinicaltrials.gov/ct2/results?term=%22distal+hereditary+motor+neuropathy%2C+type+II%22+%5BDISEASE%5D+OR+%22Distal+Spinal+Muscular+Atrophy%22+%5BDISEASE%5D+OR+NCT00004568+%5BBID-NUMBER%5D>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28distal+hereditary+motor+neuropathy%5BTIAB%5D%29+AND+english%5Bla%5D+AND+human%5Bmh%5D>

OMIM

- NEURONOPATHY, DISTAL HEREDITARY MOTOR, TYPE IIA
<http://omim.org/entry/158590>
- NEURONOPATHY, DISTAL HEREDITARY MOTOR, TYPE IIB
<http://omim.org/entry/608634>

Sources for This Summary

- Fontaine JM, Sun X, Hoppe AD, Simon S, Vicart P, Welsh MJ, Benndorf R. Abnormal small heat shock protein interactions involving neuropathy-associated HSP22 (HSPB8) mutants. *FASEB J*. 2006 Oct;20(12):2168-70. Epub 2006 Aug 25.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/16935933>
- Hu Z, Chen L, Zhang J, Li T, Tang J, Xu N, Wang X. Structure, function, property, and role in neurologic diseases and other diseases of the sHsp22. *J Neurosci Res*. 2007 Aug 1;85(10):2071-9. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/17304582>
- Ikeda Y, Abe A, Ishida C, Takahashi K, Hayasaka K, Yamada M. A clinical phenotype of distal hereditary motor neuronopathy type II with a novel HSPB1 mutation. *J Neurol Sci*. 2009 Feb 15; 277(1-2):9-12. doi: 10.1016/j.jns.2008.09.031. Epub 2008 Oct 25.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/18952241>
- Irobi J, Van Impe K, Seeman P, Jordanova A, Dierick I, Verpoorten N, Michalik A, De Vriendt E, Jacobs A, Van Gerwen V, Vennekens K, Mazanec R, Tournev I, Hilton-Jones D, Talbot K, Kremensky I, Van Den Bosch L, Robberecht W, Van Vandeckerckhove J, Van Broeckhoven C, Gettemans J, De Jonghe P, Timmerman V. Hot-spot residue in small heat-shock protein 22 causes distal motor neuropathy. *Nat Genet*. 2004 Jun;36(6):597-601. Epub 2004 May 2.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/15122253>
- James PA, Rankin J, Talbot K. Asymmetrical late onset motor neuropathy associated with a novel mutation in the small heat shock protein HSPB1 (HSP27). *J Neurol Neurosurg Psychiatry*. 2008 Apr;79(4):461-3. doi: 10.1136/jnnp.2007.125179.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/18344398>
- Shemetov AA, Seit-Nebi AS, Gusev NB. Structure, properties, and functions of the human small heat-shock protein HSP22 (HspB8, H11, E2IG1): a critical review. *J Neurosci Res*. 2008 Feb 1; 86(2):264-9. Review.
Citation on PubMed: <https://www.ncbi.nlm.nih.gov/pubmed/17722063>

Reprinted from Genetics Home Reference:

<https://ghr.nlm.nih.gov/condition/distal-hereditary-motor-neuropathy-type-ii>

Reviewed: August 2009

Published: March 21, 2017

Lister Hill National Center for Biomedical Communications
U.S. National Library of Medicine
National Institutes of Health
Department of Health & Human Services